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PROGRESS REPORT 134

PENNSYLVANIA GEOLOGICAL SURVEY

FOURTH SERIES

PRELIMINARY REPORT

LEIDY GAS FIELD AND ADJACENT AREAS

CLINTON COUNTY

PENNSYLVANIA

By

J. R. EBRIGHT AND A. I. INGHAM

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF INTERNAL AFFAIRS

WILLIAM S. LIVENGOOD, JR., *Secretary*

TOPOGRAPHIC AND GEOLOGIC SURVEY

S. H. CATHCART, *Director*

JANUARY 1951

P 38.12
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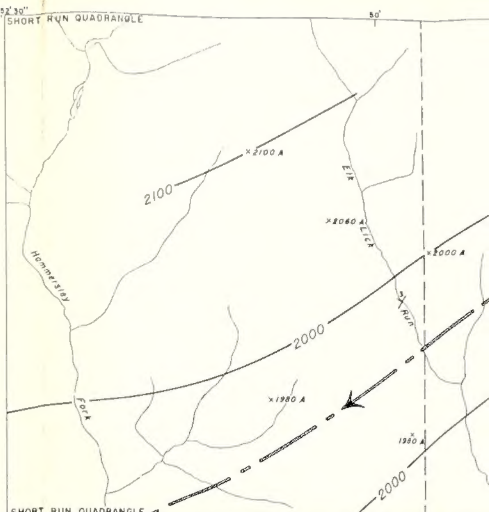
PRELIMINARY MAP
GEOLOGIC STRUCTURE
OF
LEIDY GAS FIELD AND ADJACENT AREAS
CLINTON COUNTY, PENNSYLVANIA

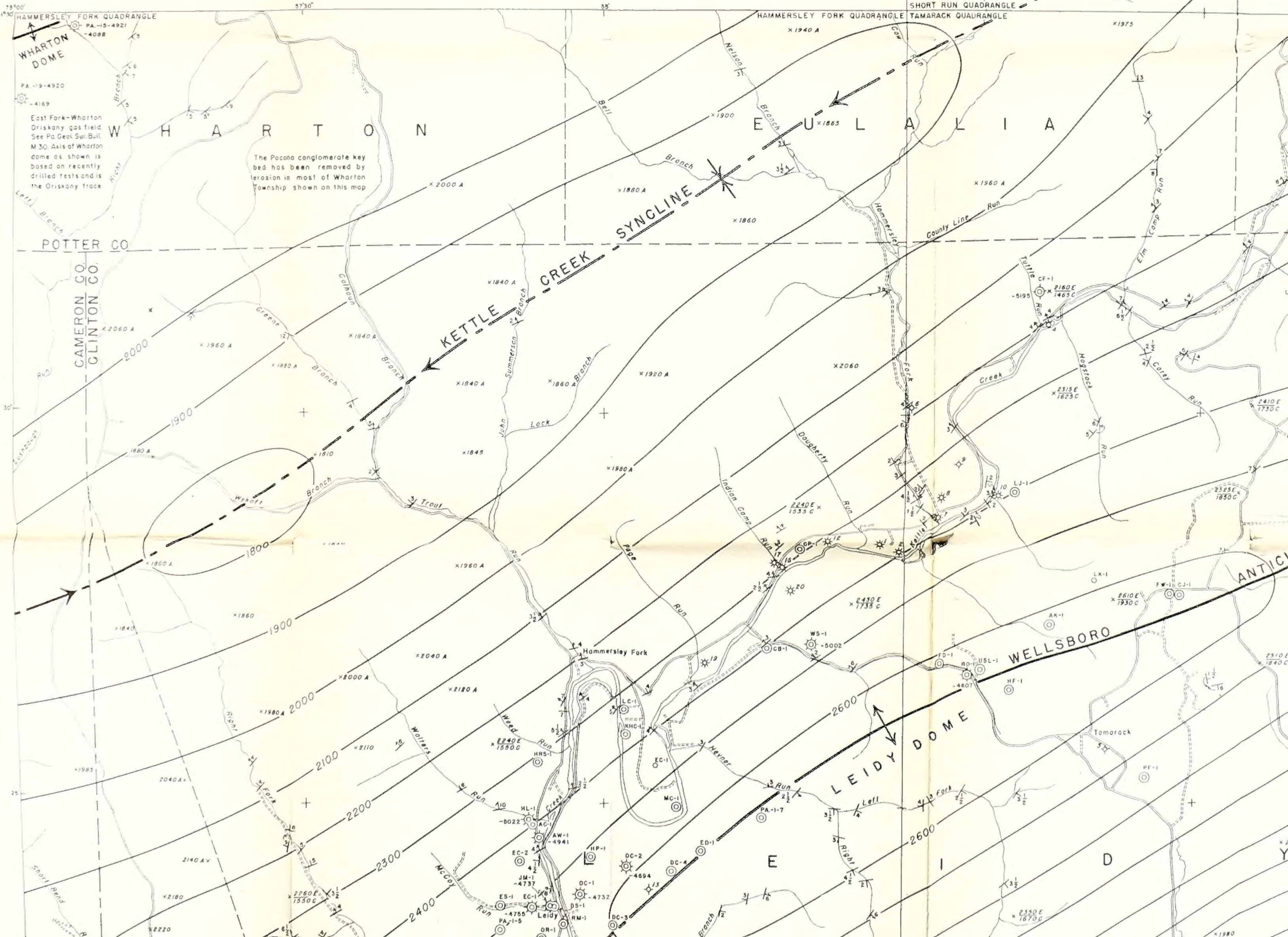
Geology by J.R. Ebright and A.I. Ingham
December 1950

Pennsylvania Geological Survey
4th Series, Preliminary Report 134

Scale

0 2000 4000 6000 8000 10000 12000 FEET


77°52'30"
41°32'30"
SHORT RUN QUADRANGLE
50'
2100
×2100 A
Elk
×2060 A
Lick
×2000 A
Hammersley
Run
2000
×1980 A
Fork
1980 A
2000

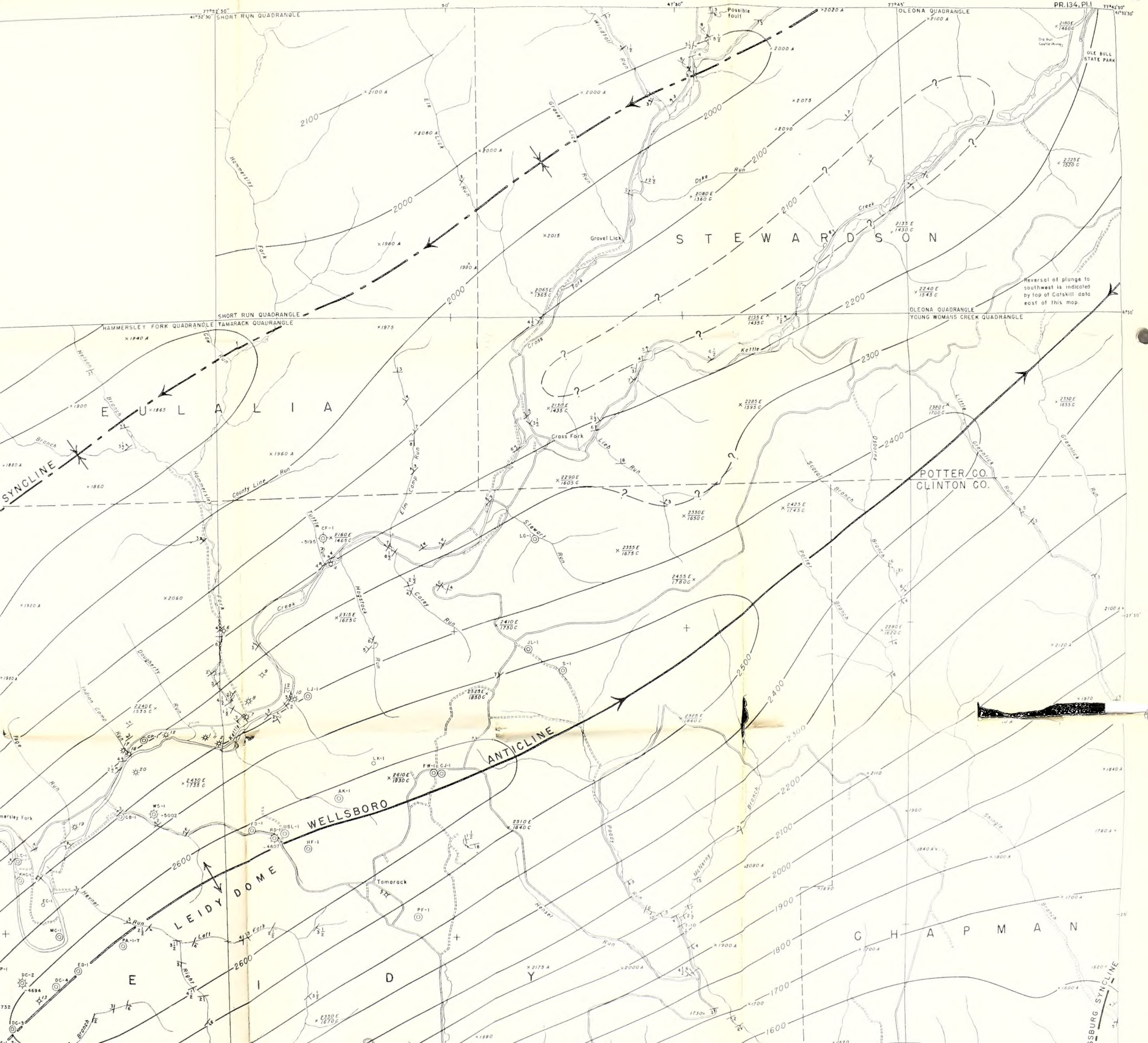

78°00'
41°30'
HAMMERSLEY FORK QUADRANGLE
57'30"
55'
HAMMERSLEY FORK QUADRANGLE
SHORT RUN QUADRANGLE
TAMARACK QUADRANGLE
PA.-15-4921
-4088
WHARTON DOME
PA.-19-4920
-4169
East Fork-Wharton Oriskany gas field. See Pa. Geol. Sur. Bull. M 30. Axis of Wharton dome as shown is based on recently drilled tests and is the Oriskany trace
The Pocono conglomerate key bed has been removed by erosion in most of Wharton Township shown on this map
W H A R T O N
E U L A L I A
POTTER CO
CAMERON CO.
CLINTON CO.
KETTLE CREEK SYNCLINE
WELLSBORO ANTICLINE
LEIDY DOME
L E I D Y
Hammersley Fork
Tamarack
Leidy
Nelson Branch
Bell Branch
Cow Run
County Line Run
Calhoun Branch
Greene Branch
Summerson Branch
Lock Run
Trout Run
Wykoff Branch
Dougherty Run
Indian Camp Run
Page Run
Kettle Creek
Hevner Run
Weed Run
Walters Run
McCoy Run
Right Fork
Left Fork
Short Bend Run
Turtle Run
Elm Camp Run
Hogstock Run
Corey Run
Left Branch
Right Branch
1800
1900
2000
2100
2200
2300
2400
2600
CF-1
-5195
LJ-1
LK-1
FW-1
CJ-1
AK-1
WS-1
-5002
CB-1
FD-1
RO-1
USL-1
-4607
HF-1
LC-1
KHC-1
HRS-1
EC-1
MC-1
PA-1-7
HL-1
-5022
AC-1
AW-1
-4941
EC-2
HP-1
JM-1
-4737
DC-2
-4694
DC-4
ED-1
DC-1
-4732
ES-1
EC-1
DS-1
RM-1
-4755
PA-1-5
OR-1
DC-3
PF-1

INDEX TO WELLS

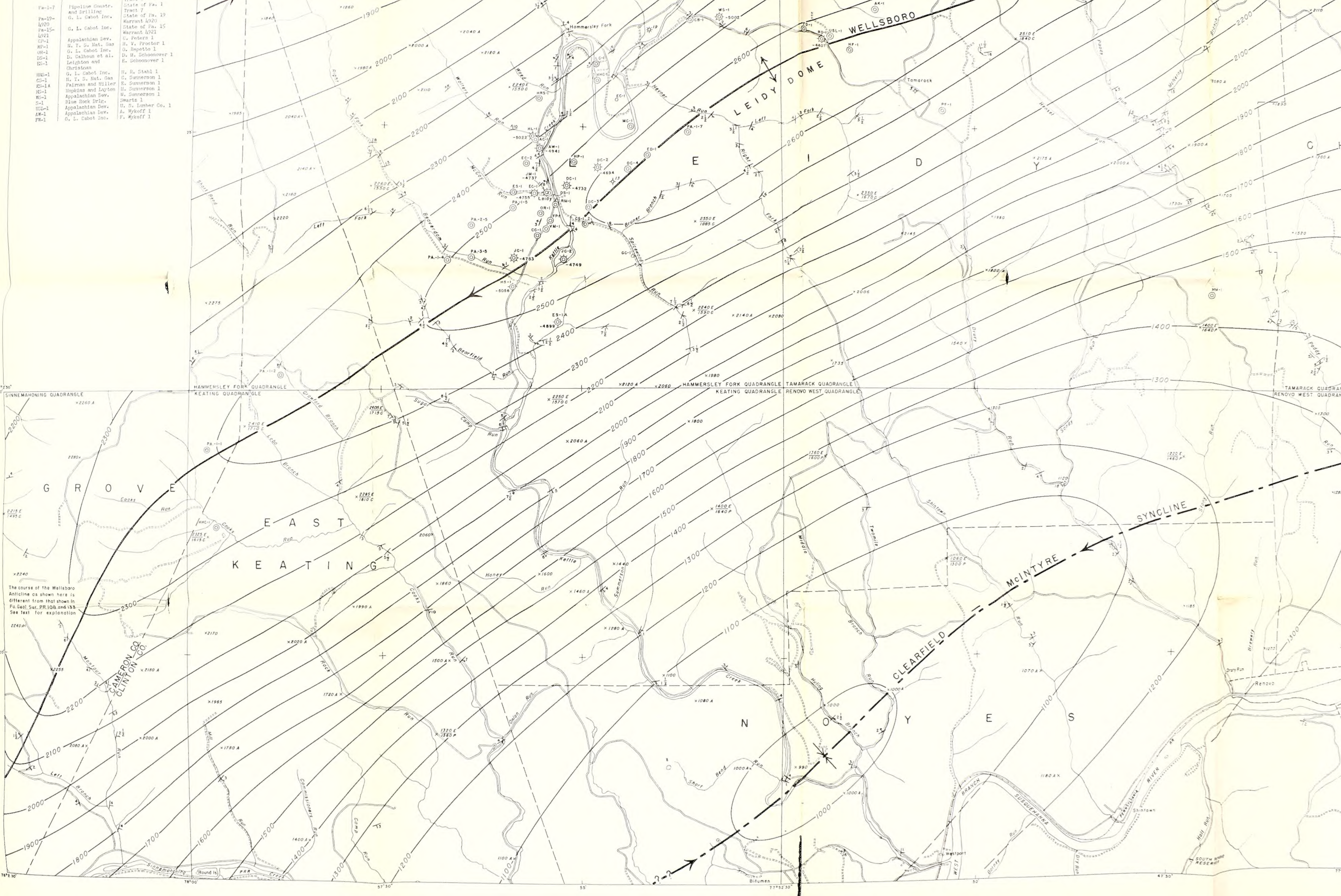
(See rear of map for detailed well data)

To Dec. 15, 1950

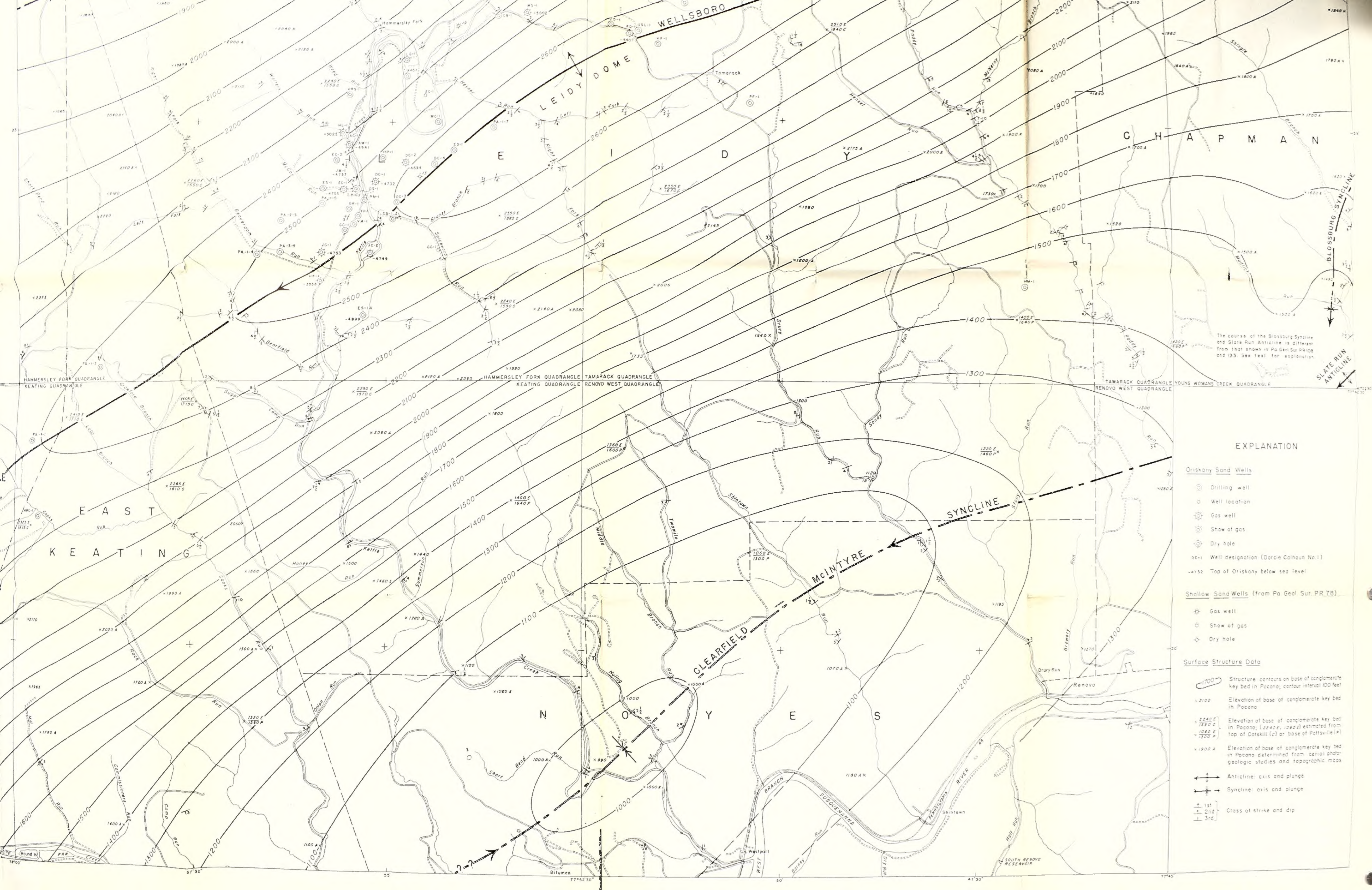
Map No.	Company	Tract and Well No.
CB-1	Pittsburgh Oil and Gas Co.	C. Brooks 1
DC-1	Leidy Prosp. Co.	D. Calhoun 1
DC-2	Leidy Prosp. Co.	D. Calhoun 2
DC-3	Leidy Prosp. Co.	D. Calhoun 3
DC-4	Leidy Prosp. Co.	D. Calhoun 4
EC-1	Appalachian Dev.	E. Calhoun 1
JC-1	G. L. Cabot Inc.	J. D. Calhoun 1
JC-2	G. L. Cabot Inc.	J. D. Calhoun 2
LC-1	D. Calhoun et al.	L. Calhoun 1
MC-1	N. Y. S. Nat. Gas	M. Calhoun 1
AC-1	Keta Gas & Oil Co.	A. Carlson 1
EC-1	N. Y. S. Nat. Gas	E. Connell 1
EC-2	N. Y. S. Nat. Gas	E. Connell 2
CC-1	Keta Gas and Oil	C. Cross 1
GC-1	N. Y. S. Nat. Gas	G. Cross 1
ED-1	N. Y. S. Nat. Gas	E. Daugherty 1
FD-1	Roeder and White	F. Daugherty 1
RD-1	N. Y. S. Nat. Gas	R. P. Daugherty 1
HF-1	N. Y. S. Nat. Gas	H. E. Finnefrock 1
CF-1	G. L. Cabot Inc.	C. Foley 1
PF-1	Shaw and Smith	P. Foley 1
LG-1	Renovo Gas and Oil	L. Green 1
HHC-1	Mid-Atlantic Oil and Gas	Homewood Hunting Club 1
LJ-1	G. L. Cabot Inc.	L. Jacobus 1
CJ-1	Appalachian Dev.	C. Johnston 1
AK-1	N. Y. S. Nat. Gas	A. Kelly 1
KHC-1	D. Calhoun et al.	Keystone Hunting Club 1
LK-1	N. Y. S. Nat. Gas	L. Kunkle 1
JL-1	G. L. Cabot Inc.	J. J. Leban 1
HL-1	Roeder and White	H. Ludy 1
HM-1	E. P. Sheridan	H. Martin 1
JM-1	Hoyley Dev.	J. McCoy 1
RM-1	Wade	R. B. McCoy 1
VM-1	Roeder and White	V. McCoy 1
FP-1	Hoyley Dev.	F. Pelkey 1
Pa-1-1	N. Y. S. Nat. Gas	State of Pa. 1 Tract 1
Pa-1-2	N. Y. S. Nat. Gas	State of Pa. 1 Tract 2
Pa-1-4	N. Y. S. Nat. Gas	State of Pa. 1 Tract 4
Pa-1-5	Appalachian Dev.	State of Pa. 1 Tract 5
Pa-2-5	Appalachian Dev.	State of Pa. 2 Tract 5
Pa-3-5	Appalachian Dev.	State of Pa. 3 Tract 5
Pa-1-7	Pipeline Constr. and Drilling	State of Pa. 1 Tract 7
Pa-19-4920	G. L. Cabot Inc.	State of Pa. 19 Warrant 4920
Pa-15-4921	G. L. Cabot Inc.	State of Pa. 15 Warrant 4921
CP-1	Appalachian Dev.	C. Peters 1
HP-1	N. Y. S. Nat. Gas	H. V. Proctor 1
OR-1	G. L. Cabot Inc.	O. Repetto 1
DS-1	D. Calhoun et al.	D. M. Schoonover 1
ES-1	Leighton and Christman	E. Schoonover 1
HRS-1	G. L. Cabot Inc.	H. R. Stahl 1
CS-1	N. Y. S. Nat. Gas	C. Summerson 1
ES-1A	Fairman and Miller	E. Summerson 1
HS-1	Hopkins and Layton	H. Summerson 1
WS-1	Appalachian Dev.	W. Summerson 1
S-1	Blue Rock Drlg.	Swartz 1
USL-1	Appalachian Dev.	U. S. Lumber Co. 1
AW-1	Appalachian Dev.	A. Wykoff 1
FW-1	G. L. Cabot Inc.	F. Wykoff 1


PR.134, Pl.1
77°52'30"
41°32'30"
SHORT RUN QUADRANGLE
50'
47'30"
77°45'
OLEONA QUADRANGLE
77°42'30"
41°32'30"
Possible fault
Old Bull Castle (Ruins)
OLE BULL STATE PARK
Windfall Run
Elk Lick Run
Gravel Lick Run
Hammersley Fork
Gravel Lick
Dyke Run
Creek
S T E W A R D S O N
Reversal of plunge to southwest is indicated by top of Catskill data east of this map.
OLEONA QUADRANGLE
YOUNG WOMANS CREEK QUADRANGLE
41°30'
SHORT RUN QUADRANGLE
HAMMERSLEY FORK QUADRANGLE
TAMARACK QUADRANGLE
Cross Fork
Kettle
Cow Run
Nelson Branch
E U L A L I A
Branch
SYNCLINE
Cross Fork
Lieb Run
Little Greenlick Run
Greenlick Run
Osborne
Scoval Branch
POTTER CO.
CLINTON CO.
County Line Run
Tuttle Run
Elm Camp Run
Stewart Run
Hogstock Run
Corey Run
Potter Branch
Branch
Creek
Daugherty Run
Indian Camp Run
Hammersley Fork
Kettle
WELLSBORO ANTICLINE
LEIDY DOME
Tamarack
Heyner Run
Left Fork
Right
Branch
Hensel Run
Pasey
McKenny
Branch
Shingle
Branch
C H A P M A N
L E I D Y
SBURG SYNCLINE
27'30"
25'
2100
2000
2200
2300
2400
2500
2600
1900
1800
1700
1600
CF-1
LG-1
JL-1
S-1
LJ-1
LK-1
FW-1
CJ-1
AK-1
USL-1
FD-1
RD-1
HF-1
CB-1
WS-1
LC-1
KHC
EC-1
MC-1
PA-1-7
ED-1
DC-2
DC-4
DC-3
PF-1
-5195
-5002
-4607
-4694

Pa-1-7	Pipeline Constr. and Drilling	State of Pa. 1 Tract 7
Pa-19- 4920	G. L. Cabot Inc.	State of Pa. 19 Warrant 4920
Pa-15- 4921	G. L. Cabot Inc.	State of Pa. 15 Warrant 4921
CP-1	Appalachian Dev.	C. Peters 1
HP-1	N. Y. S. Nat. Gas	H. V. Proctor 1
OR-1	G. L. Cabot Inc.	O. Repetto 1
DS-1	D. Calhoun et al.	D. M. Schoonover 1
ES-1	Leighton and Christman	E. Schoonover 1
HRS-1	G. L. Cabot Inc.	H. R. Stahl 1
CS-1	N. Y. S. Nat. Gas	C. Summerson 1
ES-1A	Fairman and Miller	E. Summerson 1
HS-1	Hopkins and Layton	H. Summerson 1
WS-1	Appalachian Dev.	W. Summerson 1
S-1	Blue Rock Drlg.	Swartz 1
USL-1	Appalachian Dev.	U. S. Lumber Co. 1
AW-1	Appalachian Dev.	A. Wykoff 1
FW-1	G. L. Cabot Inc.	F. Wykoff 1


WELLSBORO
LEIDY DOME
L E I D Y
G R O V E
E A S T
K E A T I N G
N O Y E S
C
CLEARFIELD
McINTYRE
SYNCLINE
HAMMERSLEY FORK QUADRANGLE
KEATING QUADRANGLE
TAMARACK QUADRANGLE
RENOVO WEST QUADRANGLE
SINNEMAHONING QUADRANGLE
CAMERON CO.
CLINTON CO.
Hammersley Fork
Leidy
Tamarack
Renovo
Westport
Shintown
Bitumen
SUSQUEHANNA RIVER
WEST BRANCH
Kettle Creek
Sinnemahoning Creek
Round Is.
SOUTH RESER.
Pennsylvania
PRR
78°2'30"
41°22'30"
78°00'
57'30"
55'
77°52'30"
50'
47'30"
20'
25'
2600
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000

The course of the Wellsboro Anticline as shown here is different from that shown in Pa. Geol. Sur. PR. 108 and 133. See text for explanation.


WELLSBORO
LEIDY DOME
L E I D Y
C H A P M A N
BLOSSBURG SYNCLINE
SLATE RUN ANTICLINE
EAST KEATING
N O Y E S
CLEARFIELD McINTYRE SYNCLINE
HAMMERSLEY FORK QUADRANGLE
KEATING QUADRANGLE
HAMMERSLEY FORK QUADRANGLE TAMARACK QUADRANGLE
KEATING QUADRANGLE RENOVO WEST QUADRANGLE
TAMARACK QUADRANGLE YOUNG WOMANS CREEK QUADRANGLE
RENOVO WEST QUADRANGLE
Hammersley Fork
Tamarack
Leidy
Renovo
Drury Run
Shintown
Westport
Bitumen
SOUTH RENOVO RESERVOIR
WEST BRANCH SUSQUEHANNA RIVER
PENNSYLVANIA RR
PRR
Round Is.
78°00'
57'30"
55'
77°52'30"
50'
47'30"
77°45'
77°42'30"
EXPLANATION
Oriskany Sand Wells
Drilling well
Well location
Gas well
Show of gas
Dry hole
DC-1 Well designation (Darcie Calhoun No.1)
-4732 Top of Oriskany below sea level
Shallow Sand Wells (from Pa Geol. Sur. PR 78)
Gas well
Show of gas
Dry hole
Surface Structure Data
1700 Structure contours on base of conglomerate key bed in Pocono; contour interval 100 feet
×2100 Elevation of base of conglomerate key bed in Pocono
×2240 E / 1590 C, ×1060 E / 1300 P Elevation of base of conglomerate key bed in Pocono; (2240 E, 1060 E) estimated from top of Catskill (C) or base of Pottsville (P)
×1900 A Elevation of base of conglomerate key bed in Pocono determined from aerial photogeologic studies and topographic maps
Anticline: axis and plunge
Syncline: axis and plunge
1st, 2nd, 3rd Class of strike and dip

The course of the Blossburg Syncline and Slate Run Anticline is different from that shown in Pa. Geol. Sur. PR 108 and 133. See text for explanation.

PRELIMINARY REPORT

LEIDY GAS FIELD AND ADJACENT AREAS
CLINTON COUNTY, PENNSYLVANIA

by

J. R. EBRIGHT AND A. I. INGHAM

INTRODUCTION

The major natural gas discovery in Pennsylvania in 1950 was the opening of the Leidy gas field Leidy Township, Clinton County, Pennsylvania. The discovery well, Leidy Prospecting Company, Dorcie Calhoun No. 1, was completed on January 8, 1950.

The significance of the Leidy field development lies in its geologic location—it has extended Oriskany gas production farther southeastward than it has been found previously in Pennsylvania and has opened a new trend along which additional Oriskany fields may be discovered. Prior to 1947, all commercial Oriskany gas production in north-central Pennsylvania was obtained on the Sabinsville, Harrison, Hebron, and Westport anticlines. The development of the East Fork-Wharton field on the Marshlands anticline in 1947 greatly extended the Oriskany producing province to the southeast; the Leidy field, on the Wellsboro anticline, is another southeast addition to the Oriskany province.

The location of the Leidy discovery and the high productivity of the wells have served to stimulate leasing and drilling of untested structures in the northern part of the Allegheny Plateau. Numerous prospects are known to exist east and southeast of the Wellsboro anticline; the heavy demand for natural gas together with the attractiveness of the recent Oriskany discoveries will, no doubt, encourage the testing of many of these prospects.

HISTORY AND DEVELOPMENT

Prior to the discovery of Oriskany gas at Leidy, a shallow (upper Devonian) gas field had been developed along Kettle Creek. As early as 1914 some gas was obtained and by 1923, 15 shallow wells had been drilled in the field (Johnson, 1923, p. 5). None of these wells are now commercially productive, but several of the Oriskany tests have obtained considerable quantities of gas from the shallow sands (see table).

The Oriskany sand discovery well in the Leidy Field, Dorcie Calhoun No. 1, came in on January 8, 1950 producing an estimated 15,000,000 cubic feet of gas per day and had a reservoir pressure of 4200 pounds. Gas is obtained at a depth of 5660 feet in the upper one foot of the Oriskany sand.

Development of the field has been fairly rapid and by the end of December 1950, 13 producing wells and 3 dry holes had been completed. In addition to these wells, 41 other tests are drilling or located on the dome and adjacent areas. To date the producing area of the field is approximately 3 1/2 miles long and 2 1/2 miles wide.

The Oriskany sand in the various wells is encountered at depths ranging from 5659 to 6533 feet below the surface.

The initial open flow volumes of the producing wells completed thus far have varied from 270,000 cubic feet to about 50,000,000 cubic feet of gas per day; initial reservoir pressures have ranged from 3900 to 4200 pounds.

Three pipe lines — a 16-inch, an 8-inch, and a 5-inch — are taking gas out of the field.

GEOLOGIC INVESTIGATIONS

Following discovery of gas in the Oriskany sand in 1930, S. H. Cathcart of the Pennsylvania Geological Survey made a reconnaissance structural investigation (Cathcart, 1934) of the Allegheny Plateau between McKean County on the west and the Delaware River on the east. The structure of this area was determined by the strike and dip method and special efforts were made to define the domal structures on the anticlines.

Cathcart's study showed the structural grain of the area and in various places it was a refinement and/or addition to the geologic structure as delineated by Pennsylvania's Second Geological Survey of the latter part of the 1800's.

The Marshlands anticline, on which the East Fork-Wharton field is located, was selected for a detailed geologic study in 1947 and the results of this investigation have been published (Ebright et al., 1949). A similar project was begun in the Leidy gas field area on the Wellsboro anticline in the summer of 1950. The accompanying map and text are a preliminary report on this study; a more extensive report, now being prepared, will be issued in the near future.

METHOD OF INVESTIGATION

The field work in connection with this study was done by J. R. Ebright assisted by Harry V. Gouse. The project was under the direction of A. I. Ingham.

The geology of the Wellsboro anticline in the area embraced by this study was determined by strike and dip measurements, areal distribution of various stratigraphic units, and the tracing of key beds.

As in the East Fork-Wharton report (Ebright et al., 1949), strike and dip data have been evaluated according to reliability and designated on the map as first, second, or third class. Criteria used in classifying these measurements include the size of the outcrop, regularity of bedding, concordance of dips within local areas, and character of sedimentation. The authors have found this system of classification extremely helpful in evaluating the relative weight to be placed on measurements, particularly in those areas of structural complexity; moreover, it will enable the reader to judge the evidence on which the structural interpretation is based.

Two key horizons whose elevations were determined at various places on the anticline and adjacent synclines have been most useful in delineating the structure. These horizons are (1) the top of the Catskill red beds, and (2) the base of a Pocono conglomerate. The top of the red beds has been placed at the top of the more or less continuous red Upper Devonian section; the overlying Oswayo (uppermost Upper Devonian), Pocono, and Mauch Chunk contain some red units but the post-Catskill sediments in the area are predominantly gray.

The base of the Pocono conglomerate, contour horizon of the accompanying map, can usually be found with little difficulty. Lithologically it is distinctively coarse pebbly to conglomeratic, and often forms a prominent escarpment with accompanying small to very large boulders. This conglomerate frequently stands out in sharp relief on aerial photos; stereoscopic study of these photos, together with some ground control and the excellent topographic maps available in the area have enabled the authors to pick the datum with a considerable degree of accuracy. A more detailed discussion of these studies will be included in the final reports.

Elevations of ground control points have been determined with the altimeter.

EXPLANATION OF MAP

The base for the accompanying structural map was obtained from 7-1/2 minute quadrangle topographic maps issued by the U. S. Geological Survey. The original topographic scale of 1 inch equals 2000 feet is maintained.

the outcrop. Various points designated with the suffix letter "A", such as 1830A, were determined from aerial photo-topographic map studies. In the areas where the Pocono conglomerate has been removed by erosion, the elevation has been estimated from the top of the Catskill red beds, for example, $\frac{2200E}{1930R}$. The top number, (2200E), is the elevation of the base of the conglomerate estimated from the top of the red beds, shown below the line (1930R).

Where the suffix "P" is used with the lower elevation, it indicates an elevation on the base of the Pottsville. In this case the upper number is the elevation of the base of the Pocono conglomerate, estimated from the base of the Pottsville.

The map designation of the Oriskany sand wells is denoted by the initials of the property owner and the number of the well on the tract; for example, DC-2 is the index number for the No. 2 well on the Dorcie Calhoun tract. For wells on land owned by the Commonwealth of Pennsylvania the designation is, for example, Pa-1-2; here the first number is the well number and the second is the tract or warrant, whichever the case may be. Elevations below sea level on the top of the Oriskany sand are shown with each completed well symbol, for example, -4732.

Locations of the shallow sand (Upper Devonian) gas wells are taken from Pennsylvania Geological Survey, Progress Report 78, and the numbers correspond directly with those used in that report.

A small portion of the East Fork-Wharton gas field is also shown in the northwestern part of the accompanying map; the Oriskany trace of the Marshlands anticlinal axis was determined from subsurface data in that area.

The scheme of classifying strike and dip measurements was explained under "Method of Investigation."

STRATIGRAPHY

SURFACE

The strata exposed at the surface in this area include in descending order, the Allegheny group and the Pottsville series of the Pennsylvanian system; the Mauch Chunk series and the Pocono group of the Mississippian system; and the Oswayo formation, Catskill red beds and the Chemung facies of the Upper Devonian series.

Pennsylvanian System

Strata of the Pennsylvanian system were not studied in detail but investigations of a reconnaissance nature indicate that the Allegheny group contains sandstones, shales, clays, and several coal beds of commercial value. In descending order, the units of the Pottsville series are tentatively identified as the Homewood sandstone, the Mercer member which contains the Mercer flint clay and coal, and the Connoquenessing sandstone.

Mississippian System

The interval occupied by the Mauch Chunk is almost entirely concealed in the area but occasionally a thin bed of red shale or shaly siltstone is found near the top of the section.

The Pocono strata consist of a succession of alternating greenish- and brownish-gray sandstones, siltstones and shales with an occasional thin bed of red shale or siltstone. The upper 200 feet of the Pocono group is a fairly continuous, coarse- to very coarse grained, sandstone, the lower 30 to 40 feet of which is frequently conglomeratic and contains angular to subangular quartz pebbles. This conglomeratic unit is an excellent key bed and its base is the contour datum of the accompanying map. The writers now believe that in the East Fork-Wharton area (Ebright, et al., 1949, pp. 6, 30) this conglomeratic sandstone was erroneously correlated as the basal unit of the Pottsville series; more recent and conclusive evidence, however, indicates this conglomeratic sandstone is Mississippian in age and correlative with the Pocono conglomerate key bed of the Leidy area. This will be discussed further in the final report.

Upper Devonian Series

Lithologically the Oswayo formation is very similar to the Pocono except that the Oswayo contains more shale than the Pocono; no coarse-grained or pebbly sandstones were observed in the Oswayo.

The Catskill facies consists of alternating sandstones and shales but the dominant color is red with some grays; the rocks are less resistant to erosion than either the Oswayo or Pocono strata. Although both the upper and lower boundaries of the Catskill are somewhat transitional, the base is the most difficult to determine.

Alternating thin beds of fine-grained, greenish-gray sandstones and shales constitute the Chemung facies in the Leidy area. Red beds are also present but these become less prominent with depth. A few marine fossils have been found in the Chemung.

SUBSURFACE

At the time of writing of this report no stratigraphic studies have been made of any well samples in the Leidy field. Most of the wells start in the Catskill or Chemung and in descending order pass through the Portage facies of the Upper Devonian; the Tully limestone, Hamilton group, and Onondaga limestone of the Middle Devonian; and the Oriskany sandstone of the Lower Devonian series. Information from drillers' logs indicates that the interval between the top of the Tully and the top of the Oriskany varies from 777 to 860 feet, averaging 820 feet.

In the only well which has completely penetrated the Oriskany, the sandstone was found to be about 32 feet thick.

STRUCTURE

The major structural features of the area are the Wellsboro anticline with its structural culmination, the Leidy dome, Kettle Creek syncline, and Clearfield-McIntyre syncline. These structures trend predominantly northeast-southwest, more or less parallel to other folds in this part of the Allegheny Plateau.

The Wellsboro anticline in the Leidy area has a surface closure of about 200 feet and a width from syncline to syncline, of approximately 12 miles; the fold is asymmetric to the southeast, a characteristic feature of many of the anticlines of the northern Allegheny Plateau. The anticline plunges northeast and southwest away from the Leidy dome, site of the Leidy gas field. Cathcart (1934, p. 10) has pointed out that in the Allegheny Plateau region domes are frequently associated with sharp bends in an anticlinal axis; the Leidy dome has a similar relationship to a bend in the axis of the Wellsboro anticline. In the northeastern part of the area (Stewardson Township, Potter Co.) a shallow structural saddle along the anticlinal axis is indicated by Catskill red bed data.

In length the Wellsboro structure extends many miles to the northeast through Tioga and Bradford Counties into adjacent areas in New York; in Grove Township, Cameron County, the present study (see map) indicates the structure to turn rather sharply to the south-southwest. Previous reconnaissance investigations (Cathcart, 1934, Fig. 2) showed the Wellsboro anticline to be continuous with an anticline passing through Gibson, Benezette, and Lawrence Township in Cameron, Elk, and Clearfield Counties, respectively. The authors believe this latter structure to be en echelon north of the Wellsboro anticline; this relationship cannot be shown on the

en echelon with the Chestnut Ridge anticline, the aforementioned rather sharp deviation of the trend of the Wellsboro anticline to the south-southwest suggests the possibility that Wellsboro is equivalent to, and a continuation of, the Chestnut Ridge structure. Additional geologic work in northern Clearfield and southern Cameron County would be required to check this possibility.

Both the Kettle Creek syncline and Clearfield-McIntyre syncline trend more or less parallel to the Wellsboro anticline; each has closed structural lows within the map area. Dips become very flat toward the synclinal axes, especially in the Clearfield-McIntyre structure. An interesting relationship between the latter structure and the Wellsboro anticline is that a line drawn approximately normal to the general structural trend through the apex of the bend in the axis of the Wellsboro anticline, Leidy Township, also passes through the apex of a similar bend in the axis of the Clearfield-McIntyre syncline. This relationship may be purely chance, or on the other hand, it may have some genetic significance.

A somewhat anomalous relation is the location of the axis of the anticline in Leidy Township. It is shown here closer to the north flank than to the south flank, which is just the opposite of the relationship normally expected in an asymmetric fold. Evidence for locating the axis is apparent from the map data; the 7-1/2 degree southeast dip on Hevner Run, Leidy Township, is critical in determining the axial position. This strike-dip measurement is rated second class and was re-checked twice; there is always the possibility, of course, that the measured strata were cross-bedded.

A possible fault was observed near the axis of the Kettle Creek syncline in Stewardson Township, Potter County (see map). The beds here are severely fractured but neither a fault plane nor stratigraphic displacement could be determined with certainty. Various steep dips on the northwest flank of the anticline may represent the surface expression of subsurface faulting. Well data in the H. Summerson and E. Summerson tests suggests faulting in the subsurface, the details of which will be more apparent after additional data are obtained.

A closed structural low (2100 foot contour), also in Stewardson Township, Potter County, is suggested although no southeast dips were observed. The Pocono key bed data and spacing of the contours in the area indicate the low to be a possibility.

The termination of two structures—Blossburg syncline and Slate Run anticline—is shown in Chapman Township, Clinton County (southeastern part of map). The location of these structures is different from that previously shown (Cathcart, 1934, fig. 2) but data to the east of the map indicate the syncline turns sharply to the southwest and south; the anticline also deviates in the same direction. Both structures terminate approximately at the head of the south-plunging arrows near the axis of the Clearfield-McIntyre syncline.

Several east to southeast dips in the Tamarack quadrangle, one along a road just northeast of Carey Run, Leidy Township, and the other on the east side of Kettle Creek, Leidy Township, near Oriskany test LJ-1, may indicate a subsidiary high on the northwest flank of the Wellsboro anticline. These two strike-dip measurements, however, were considered poor third-class data and both are in an area where the dip is dominantly northwest.

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WELL RECORDS LEIDY GAS FIELD AND ADJACENT AREAS

(Listing is alphabetical by tract name)

Map No.	Company	Tract and Well No.	Township	Quadrangle	Location	Elevation	Tully	Onondaga	Oriskany	Total Depth	Completed	I.O.F. /Days* 1000 Cu. Ft.	Initial** Reservoir Pressure	Other Shows
CD-1	Pittsburgh Oil and Gas Co.	C. Crooks 1	Leidy	Hammersley Fork	1.72 mi. S 41° 27' 30" .98 mi. W 77° 52' 30"									
DC-1	Leidy Prosp. Co.	D. Calhoun 1	Leidy	Hammersley Fork	.63 mi. S 41° 25' .17 mi. W 77° 55'	928	4840-	5635-	5657-	5662	1-8-50	15,000 Est.	4200	
DC-2	Leidy Prosp. Co.	D. Calhoun 2	Leidy	Hammersley Fork	.46 mi. S 41° 25' 2.0 mi. W 77° 52' 30"	1478	5373-5405	6157-	6172-	6178	6-29-50	30,000	3950	
DC-3	Leidy Prosp. Co.	D. Calhoun 3	Leidy	Hammersley Fork	.88 mi. S 41° 25' 2.09 mi. W 77° 52' 30"	1123	4962-5067							
DC-4	Leidy Prosp. Co.	D. Calhoun 4	Leidy	Hammersley Fork	.49 mi. S 41° 25' 1.67 mi. W 77° 52' 30"									
EC-1	Appalachian Dev.	E. Calhoun 1	Leidy	Hammersley Fork	2.58 mi. S 41° 27' 30" 1.77 mi. W 77° 52' 30"	1001								
JC-1	G. L. Cabot Inc.	J. D. Calhoun 1	Leidy	Hammersley Fork	1.45 mi. S 41° 25' .73 mi. W 77° 55'	1051	4036-5051	5781-5804	5804-	5806	7-1-50	8,160	4100	
JC-2	G. L. Cabot Inc.	J. D. Calhoun 2	Leidy	Hammersley Fork	1.46 mi. S 41° 25' .19 mi. W 77° 55'	861	4633-4952	5436-	5460-5478	5487	12-7-50	270	4075	
LC-1	D. Calhoun et al.	L. Calhoun 1	Leidy	Hammersley Fork	2.16 mi. S 41° 27' 30" 2.01 mi. W 77° 52' 30"	911								
MC-1	N. Y. S. Nat. Gas	M. Calhoun 1	Leidy	Hammersley Fork	.01 mi. S 41° 25' 1.63 mi. W 77° 52' 30"	924								Gas at 675 500 M Gas at 430,443,445
AC-1	Kato Gas & Oil Co.	A. Carlson 1	Leidy	Hammersley Fork	.15 mi. S 41° 25' .52 mi. W 77° 55'	923								
EC-1	N. Y. S. Nat. Gas	E. Connell 1	Leidy	Hammersley Fork	.74 mi. S 41° 25' .53 mi. W 77° 55'	940	4881-4990	5671-	5695-	5697	12-11-50	18,500	3900	
EC-2	N. Y. S. Nat. Gas	E. Connell 2	Leidy	Hammersley Fork	.41 mi. S 41° 25' .6 mi. W 77° 55'	1352								
CC-1	Kato Gas and Oil	C. Cross 1	Leidy	Hammersley Fork	1.21 mi. S 41° 25' .47 mi. W 77° 55'	974	4771-							
OC-1	N. Y. S. Nat. Gas	O. Cross 1	Leidy	Hammersley Fork	1.42 mi. S 41° 25' 1.61 mi. W 77° 52' 30"	1109								
ED-1	N. Y. S. Nat. Gas	E. Daugherty 1	Leidy	Hammersley Fork	.32 mi. S 41° 25' 1.45 mi. W 77° 52' 30"	1442								
FD-1	Roeder and White	F. Daugherty 1	Leidy	Tamarack	1.83 mi. S 41° 27' 30" 1.9 mi. W 77° 50'	1405								
RD-1	N. Y. S. Nat. Gas	R. F. Daugherty 1	Leidy	Tamarack	1.91 mi. S 41° 27' 30" 1.69 mi. W 77° 50'	1477	5773-	6066-	6086-	6088	8-3-50	50,000	4100	
IF-1	N. Y. S. Nat. Gas	I. E. Finnefrock 1	Leidy	Tamarack	2.02 mi. S 41° 27' 30" 1.38 mi. W 77° 50'	1734								
CF-1	G. L. Cabot Inc.	C. Foley 1	Leidy	Tamarack	2.0 mi. S 41° 30' 1.19 mi. W 77° 50'	1338	5679-	6512-	6533-	6542	10-6-50	300' SW in 1 hr. D & A		
FF-1	Shaw and Smith	F. Foley 1	Leidy	Tamarack	2.69 mi. S 41° 27' 30" .37 mi. W 77° 50'	1660								
LG-1	Renovo Gas and Oil	L. Green 1	Leidy	Tamarack	2.03 mi. S 41° 30' 1.39 mi. W 77° 47' 30"									
HHC-1	Mid-Atlantic Oil and Gas	Homewood Hunting Club 1	East Keating	Keating	1.5 mi. S 41° 22' 30" 1.81 mi. W 77° 57' 30"	1533								
LJ-1	G. L. Cabot Inc.	L. Jacobus 1	Leidy	Tamarack	.55 mi. S 41° 27' 30" 1.35 mi. W 77° 50'	1297								Gas at 500
CJ-1	Appalachian Dev.	C. Johnston 1	Leidy	Tamarack	1.35 mi. S 41° 27' 30" .14 mi. W 77° 50'	1758								
AK-1	N. Y. S. Nat. Gas	A. Kelly 1	Leidy	Tamarack	1.55 mi. S 41° 27' 30" 1.08 mi. W 77° 50'	1620								100 M Gas at 1130
KHC-1	D. Calhoun et al.	Keystone Hunting Club 1	Leidy	Hammersley Fork	2.42 mi. S 41° 27' 30" 2.01 mi. W 77° 52' 30"	913								
LK-1	N. Y. S. Nat. Gas	L. Kunkle 1	Leidy	Tamarack	1.23 mi. S 41° 27' 30" .16 mi. W 77° 50'	1625								
JL-1	G. L. Cabot Inc.	J. J. Leban 1	Leidy	Tamarack	.15 mi. S 41° 27' 30" 1.47 mi. W 77° 47' 30"									
HL-1	Roeder and White	H. Ludy 1	Leidy	Hammersley Fork	.11 mi. S 41° 25' .54 mi. W 77° 55'	903	5123-	5924-5925	5935-	5935	8-15-50	3,980	3950	
HM-1	E. P. Sheridan	H. Martin 1	Leidy	Tamarack	1.82 mi. S 41° 25' 1.67 mi. W 77° 45'	1747								
JM-1	Moyley Dev.	J. McCoy 1	Leidy	Hammersley Fork	.76 mi. S 41° 25' .38 mi. W 77° 55'	939	4852-	5660-	5676-	5677	[illegible]-50	16,500	3975	
RM-1	Wade	R. P. McCoy 1	Leidy	Hammersley Fork	.84 mi. S 41° 25' .37 mi. W 77° 55'	873	4757-4860	5560-						
VM-1	Roeder and White	V. McCoy 1	Leidy	Hammersley Fork	1.15 mi. S 41° 25' .4 mi. W 77° 55'	863								
FP-1	Moyley Dev.	F. Pelkey 1	Leidy	Hammersley Fork	1.03 mi. S 41° 25' .23 mi. W 77° 55'	867	4734-4846	5550-						
Pa-1-1	N. Y. S. Nat. Gas	State of Pa. 1 Tract 1	Grove	Keating	.67 mi. S 41° 22' 30" 1.96 mi. W 77° 57' 30"	1770								
Pa-1-2	N. Y. S. Nat. Gas	State of Pa. 1 Tract 2	East Keating	Hammersley Fork	2.7 mi. S 41° 25' 1.14 mi. W 77° 57' 30"	1610								
Pa-1-4	N. Y. S. Nat. Gas	State of Pa. 1 Tract 4	Leidy	Hammersley Fork	1.47 mi. S 41° 25' 1.45 mi. W 77° 55'									
Pa-1-5	Appalachian Dev.	State of Pa. 1 Tract 5	Leidy	Hammersley Fork	.9 mi. S 41° 25' .75 mi. W 77° 55'	1205								
Pa-2-5	Appalachian Dev.	State of Pa. 2 Tract 5	Leidy	Hammersley Fork	1.09 mi. S 41° 25' 1.13 mi. W 77° 55'	1146								
Pa-3-5	Appalachian Dev.	State of Pa. 3 Tract 5	Leidy	Hammersley Fork	1.45 mi. S 41° 25' 1.19 mi. W 77° 55'	927								
Pa-19-4920	G. L. Cabot Inc.	State of Pa. 19 Warrant 4920	Wharton	Hammersley Fork	.62 mi. S 41° 30' 2.13 mi. W 77° 57' 30"	2253	5711-	6600-	6622-	6634	7-14-50	1,800 with SW D & A	1000	
Pa-15-4921	G. L. Cabot Inc.	State of Pa. 15 Warrant 4921	Wharton	Hammersley Fork	.04 mi. S 41° 30' 1.71 mi. W 77° 57' 30"	1940	5325-	6016-	6028-	6051	11-14-49	21,600	2100	130 M Gas at 460
CP-1	Appalachian Dev.	C. Peters 1	Leidy	Hammersley Fork	1.99 mi. S 41° 27' 30" .75 mi. W 77° 52' 30"	960								
HP-1	N. Y. S. Nat. Gas	H. V. Proctor 1	Leidy	Hammersley Fork	.39 mi. S 41° 25' .08 mi. W 77° 55'	1120	5098-5204	5878-	5899-	5901	11-15-50	13,500	3540	
OR-1	G. L. Cabot Inc.	O. Repetto 1	Leidy	Hammersley Fork	.97 mi. S 41° 25' .45 mi. W 77° 55'	1136		5834-5842	5842-	5843	12-15-50	30,000	3600	
DS-1	D. Calhoun et al.	D. M. Schoonover 1	Leidy	Hammersley Fork	.76 mi. S 41° 25' .35 mi. W 77° 55'	918								
ES-1	Leighton and Christman	E. Schoonover 1	Leidy	Hammersley Fork	.75 mi. S 41° 25' .75 mi. W 77° 55'	1007								
HHS-1	G. L. Cabot Inc.	H. H. Stahl 1	Leidy	Hammersley Fork	2.56 mi. S 41° 27' 30" .45 mi. W 77° 55'	1265								
CS-1	N. Y. S. Nat. Gas	C. Summerson 1	Leidy	Hammersley Fork	1.08 mi. S 41° 25' 2.14 mi. W 77° 52' 30"	936								
ES-1A	Fairman and Miller	E. Summerson 1	Leidy	Hammersley Fork	2.17 mi. S 41° 25' .26 mi. W 77° 55'	954	5057-	5812-	5853-5865	5869	10-3-50	300' of SW in 5 days; D & A		
HS-1	Hopkins and Layton	H. Summerson 1	Leidy	Hammersley Fork	1.77 mi. S 41° 25' .74 mi. W 77° 55'	904	5062-5128	5742-	5960-	5962	11-2-50	SW too much to bail; D & A		50 M Gas at 820
WS-1	Appalachian Dev.	W. Summerson 1	Leidy	Hammersley Fork	1.69 mi. S 41° 27' 30" .66 mi. W 77° 52' 30"	1292	5477-	6281-	6294-	6305	9-22-50	4,100		
S-1	Blue Rock Drlg.	Swartz 1	Leidy	Tamarack	.37 mi. S 41° 27' 30" 1.15 mi. W 77° 47' 30"	1690								
USL-1	Appalachian Dev.	U. S. Lumber Co. 1	Leidy	Tamarack	1.89 mi. S 41° 27' 30" 1.6 mi. W 77° 50'	1586								
AW-1	Appalachian Dev.	A. Wykoff 1	Leidy	Hammersley Fork	.24 mi. S 41° 25' .47 mi. W 77° 55'	860	5005-	5735-	5810-	5826	11-2-50	3,000	3950	
FW-1	G. L. Cabot Inc.	F. Wykoff 1	Leidy	Tamarack	1.14 mi. S 41° 27' 30" .71 mi. W 77° 50'	1747	5730-5790							
Map No.	Company	Tract and Well No.	Township	Quadrangle	Location	Elevation	Tully	Onondaga	Oriskany	Total Depth	Completed	I.O.F. /Days* 1000 Cu. Ft.	Initial** Reservoir Pressure	Other Shows

*I.O.F.—Initial open flow

**Pressure in pounds per square inch